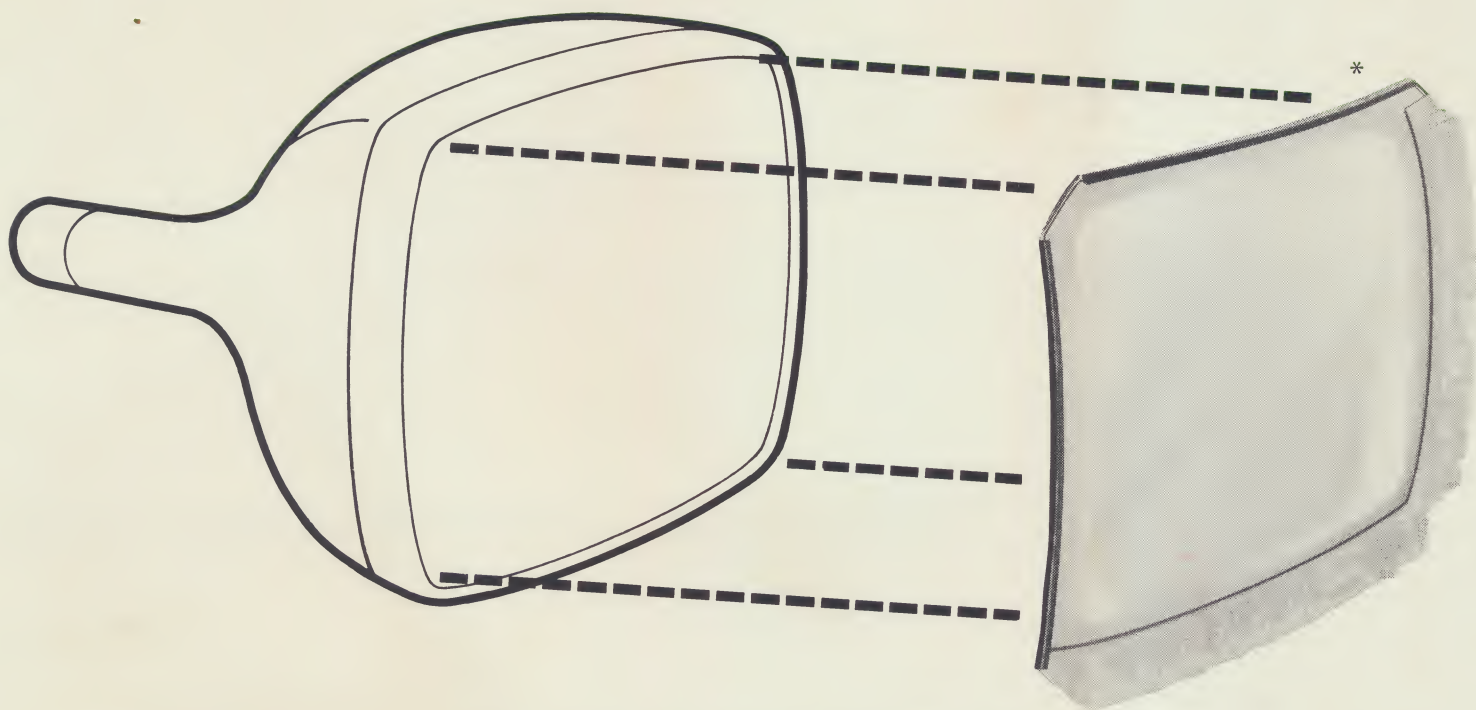
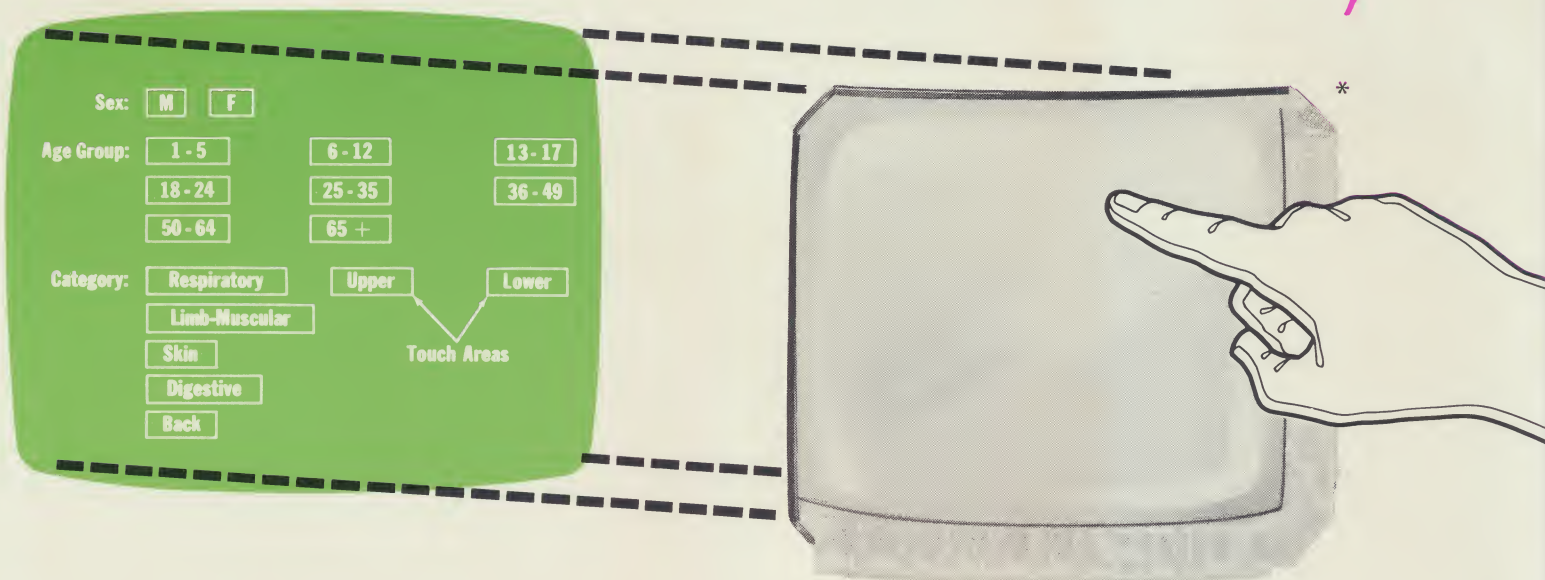




TSD DISPLAY PRODUCTS, INC.

July 79



TOUCH SCREEN DIGITIZER

A new concept in data interaction that enables completely untrained personnel to gain access to a data base by simply touching the screen with a finger. By adding this device to their display systems, the manufacturers of terminal equipment or systems using CRT's can greatly enhance the simplicity of operation and flexibility of their equipment. The device eliminates fixed-function keyboards and cumbersome lightpens, permitting the operator to devote his attention exclusively to the display.

* Shaded area shows electronics with covers removed.

FEATURES

- Operator uses a finger to select data directly from the display
- Fast and convenient data access
- No operator training required
- Extremely high stability, since the detection of screen location is on a time base and not amplitude dependent
- Outstanding reliability, since the touch surface is normal glass and does not require any special surface properties or materials (such as wire grids, light paths, etc.)
- Touch position detection uses a time base to provide continuous coverage of the active area, so that resolution is higher than can be obtained with other techniques using discrete touch pads
- Screen matches the curvature of many CRT's—a minimum of parallax optimizes operator's pointing accuracy
- Operator has feeling of positive action because he touches the screen
- Eliminates keyboard in many data retrieval applications

A TYPICAL DISPLAY FORMAT

A popular application of the TSD is in the area of medical diagnosis carried out via a "Family Tree" diagnostic procedure between an interviewer (doctor or other medically trained personnel) and the patient or subject. A typical "Menu" display is shown below.

Sex:

Age Group:

Category:

Touch Areas

APPLICATIONS

The applications where the Touch Screen Digitizer can be used to advantage are almost limitless and include such areas as: executive data base interaction, education, medical diagnosis, voter registration, bank customer service, air traffic control, etc. The following table gives some examples of how the TSD can be applied to an interactive communication system.

BASIC CONFIGURATION	TYPICAL APPLICATION
TOUCH SCREEN DISPLAY WITH OR WITHOUT DATA ENTRY KEYBOARD	Interaction on a question-and-answer basis with untrained operators. Screen displays a series of questions and a set of acceptable answers. Operator selects appropriate answer. Education, Medical Diagnosis, Voter Registration, Electronic Shopping (Retail), and Bank Customer Service. Any highly interactive system which requires both data entry, editing, and fast operator action. Air Traffic Control, Tabular Displays, Education, Engineering, Complex Data Base Interaction—Financial and Market Trading.
TOUCH SCREEN DISPLAY WITH SPECIALIZED DATA ENTRY KEYBOARD (NUMERIC-SYMBOLIC)	Process Control. Utilities, Continuous Flow Processors — Chemical, Metallurgical, etc.

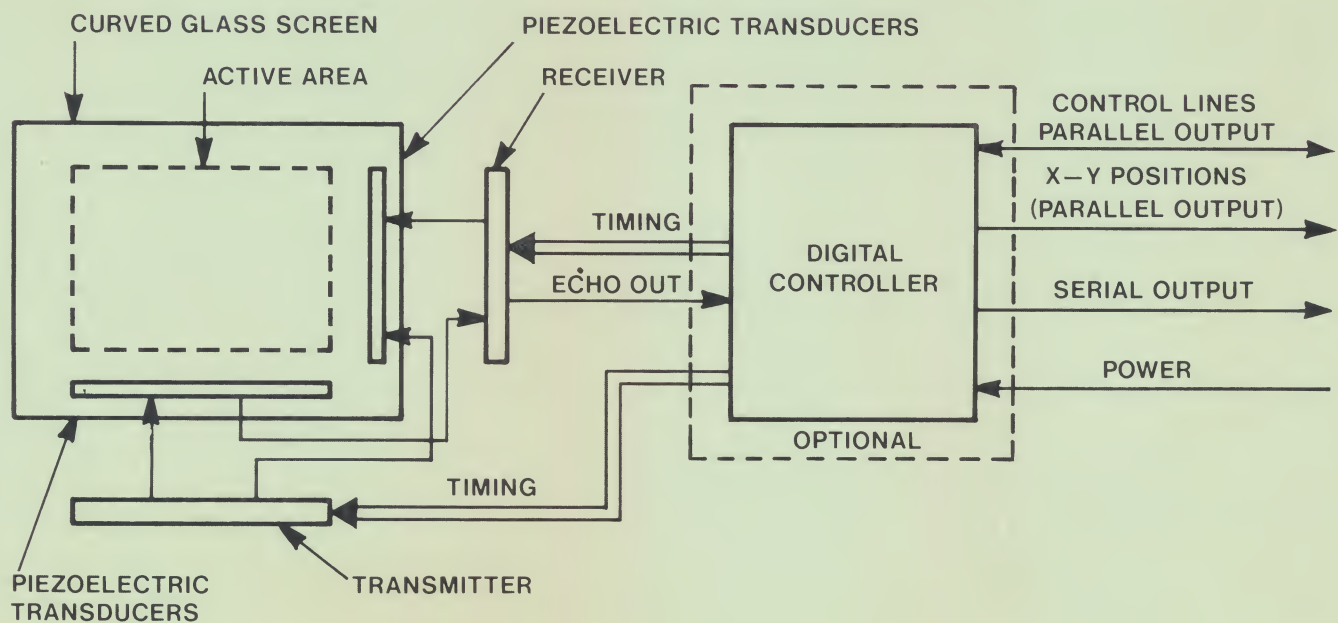
THEORY OF OPERATION

The Touch Screen Digitizer (TSD) is used as a convenient data entry device for interactive man-machine communication. It consists of a curved transparent glass sheet which is mounted over a digital display (normally a CRT terminal display). By touching the glass surface with a passive probe such as a finger, the X and Y coordinates of the contact point are determined electronically and transmitted to the computer controlling the display. Because the glass screen is curved to match the radius of many common display CRT's, there is very little parallax between the touch screen and the display; this reduces operator pointing errors. Since a definite touch is required, the operator has a positive feedback when he is making his selection.

the acoustic echo to return into target distance.

The touch screen system can operate in one of two modes which are selectable by a switch on the optional controller board. The first mode is "Continuous" where data is produced in a constant time stream (one set of echoes every 12 to 15 milliseconds) whenever an object is touching the glass surface. This mode of operation is useful if the target on the glass must be tracked continuously, but it does require a fair amount of central processor time to handle and filter the data stream.

The second operating mode is "Touch/No-Touch", when the touch screen operator must select pre-determined areas on the screen. In this mode, only



The Touch Screen Digitizer consists of two parts: the glass screen with some integral electronics mounted directly on the glass and a separate optional digital controller board which provides all the timing signals and digital processing required for the electronics mounted on the screen. The outputs from the digital controller are 8-bit binary X and Y positions available either in serial or parallel form.

The TSD uses acoustic surface waves generated by piezoelectric transducers located along two sides of the digitizing surface to sense the position of an object in contact with the glass. An acoustic surface wave (Rayleigh wave) travels along the free boundary of a solid, much like a ripple on the surface of a pond. The acoustic waves are reflected by the passive target and are used as an echo ranging system (like that used in radar or sonar) for determining the X and Y coordinates of the point of contact with the glass surface. This technique converts the time taken for

one XY value is required for each touch of the screen and the microprocessor performs more time filtering on the position data to eliminate any false data caused by the target (such as a finger) gradually contacting the screen. (Since the touch screen responds to the earliest echo received, there is a shift in position as a fingertip contacts the glass and flattens against it.)

The XY data from the touch screen and the Touch/No-Touch indications are available in either parallel or serial form. The parallel data is available at all times, but the serial data is enabled with a switch on the controller. Slow baud rates for serial data will reduce the data rate while in the "Continuous" mode.

For customers who would prefer to integrate the controller function into their own digital system, TSD will supply complete interface specifications for using the touch screen by itself.

SPECIFICATIONS *

ACTIVE AREA	Maximum 8" x 10"
RESOLUTION	Adjustable from 0.05" to 0.15" (other resolutions available on request)
SENSITIVITY	Responds to the light touch of a finger anywhere within active area
SCREEN FORMAT	When using a finger as an echo source, an operator is limited by finger size and can accurately select only points about 1/2" apart. When using a 15" diagonal CRT displaying 24 lines of 80 characters, a matrix of 12 by 20 "touch pads" works well, but the touch screen controller is not limited to this format or resolution.
MECHANICAL	For use with 15-inch CRT's. Other sizes available on request.
DIMENSIONS	12 ^{7/8} " x 14 ^{7/8} " — For 15-inch CRT's with 25" spherical curvature
OUTPUT FORMAT PARALLEL DATA	8-bit binary X and Y positions are available on a Tristate bus with standard TTL levels. Flags are available for touch and no-touch conditions; enable lines are used for reading data.
SERIAL DATA	8-bit binary or octal ASCII data with variable parity and baud rate RS232C levels.
POWER REQUIREMENTS	+ 5 volts \pm 5%, 1.4 amperes + 30 volts \pm 7%, 190 ma - 12 volts \pm 5%, 70 ma

*Specifications are subject to change without notice and apply to the touch screen and optional digital controller.



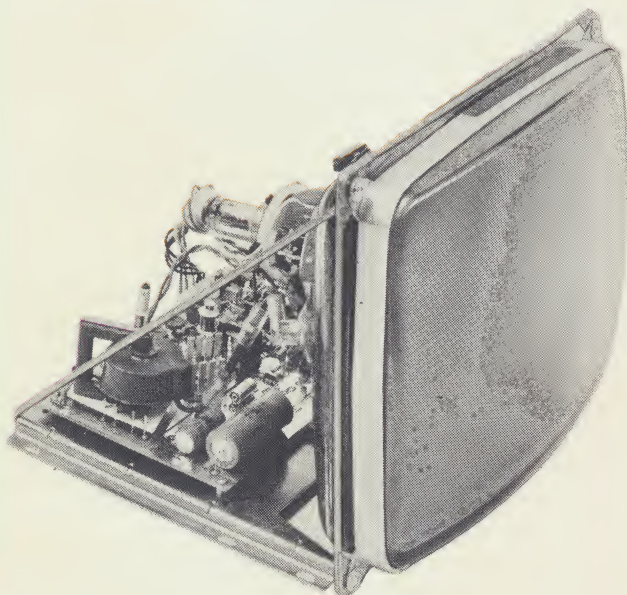
TSD DISPLAY PRODUCTS, INC.

*Sales/Service • 35 Orville Drive • Bohemia, New York 11716/Tel. 516-589-6800 • Telex 14-4659
Manufacturing • 302 Legget Drive • Kanata, Ontario K2K 1Y5, Canada/Tel. 613-592-1774*



TSD DISPLAY PRODUCTS, INC.

MODEL NDC-15 DISPLAY MONITOR



FEATURES

- Wide Video Bandwidth—35 MHz
- Extremely Good Linearity
- Uniform Characteristics Across the Entire Screen
- Horizontal Retrace Time That is Typically Less Than 6 Microseconds
- Extremely Fast Vertical Retrace Time—Less than 300 Microseconds
- Horizontal Frequency 15.750 kHz — Higher Frequencies Available as Options.
- Skip Scan With a Settling Time of Less Than 20 Microseconds
- Electrical and Mechanical Capability Comparable with Motorola and Ball Brothers Monitors

HIGHLIGHTS

The NDC-15 provides high-definition, sharp, and highly reliable image presentation. A specially designed PC board and electronics are incorporated in the monitor to achieve performance levels that have heretofore not been possible with other devices of this type. Separate horizontal drive, vertical drive, and video signal inputs have made it possible to provide simple interface circuitry.

The PC board incorporates quality components that include the flyback transformer and exclude only the series pass regulator, transformer, and the deflection yoke. Since most components are mounted on the PC board, field maintenance is extremely simple, and the entire board can be replaced in minutes. Furthermore, troubles can be identified easily and repairs made instantly. The integrated construction also means that manufacturers using the NDC-15 will have to handle fewer mounting holes, fewer connectors, and very little wiring.

The video bandwidth, combined with state-of-

the-art technology, enables the display of a sharp picture with high resolution throughout the CRT display. Resolution is a minimum of 1000 TV lines at the center and 750 lines at the corners of the display.

A minimum MTBF of 10,000 hours with a 90 percent confidence level is achieved with the NDC-15. The unit is delivered with P4 phosphor as standard. Available options are P31, P39, and P42 phosphors as well as a power supply module that is compatible with practically any standard power source being used today.

Since distortion is minimized and linearity is achieved by means of highly refined and precise components, the picture squareness that is attained is comparable with that of more expensive video equipment. Raster squareness and scanning linearity are assured because distortions do not displace any picture element from its geometrically ideal position by more than 2 percent of the raster height.

July 79

SPECIFICATIONS *

GENERAL CHARACTERISTICS

Screen Size	15 inches / measured diagonally
Raster Size	7½ x 10½ inches (max)
Deflection Angle	110 degrees
Neck Diameter	28 mm (1-1/8 inches nominal)
Phosphor	Standard: P-4 (Options: P-31, P-39, and P-42)
Implosion Protection	Tension band or T-band with bonded face plate (optional)
Horizontal Scan Frequency	15.750 kHz (higher frequencies optional)
Vertical Retrace Time	Less than 300 microseconds; operates with current feedback and S correction
Horizontal Retrace Time	Less than 7 microseconds
Focus Modulator	True parabola voltage swing of 300 volts p-p max, self-adjusting; horizontal correction only
Spot Burn Protection	Absolute beam cutoff on shut-down
Construction	Self-contained single board pcb construction—except for tube, yoke, series pass regulator, and transformer
PCB	Computer grade ground plane pcb design
Components	Uses computer grade components

INPUT SIGNALS

Vertical Sync	Positive-going or negative-going pulse (TTL level) 10 to 10,000 microseconds; circuit is leading edge triggered. Input impedance > 2000 ohms to ground
Horizontal Sync	Positive-going pulse (TTL level), 3 to 33 microseconds; circuit is leading edge triggered. Input impedance > 2000 ohms to ground
Vertical Step, Skip or Jump Signal	Positive-going pulse (TTL level) 0—30 microseconds for four line minimum vertical displacement.
Intensify Character	Negative-going pulse (TTL level); duration as required.
Video	Black negative, 2 to 4 volts at an input impedance level of 270 ohms (video gain control on board). The video amplifier delivers a large signal (20-volt swing) to the CRT cathode in a flat bandwidth of 35 MHz (20-ns rise or fall time). Small signal bandwidth is greater than 50 MHz.

ADJUSTMENTS

Video Gain	
Brightness	Remote 100-kilohm potentiometer (range includes cutoff of video peaks). G2 electrode voltage sets maximum desired background brightness level (master brightness) and equalizes CRT tube cutoff characteristics in production.
Background	
Focus	
Vertical Height	
Vertical Linearity	
Horizontal Width	
Horizontal Linearity	
Horizontal Delay from Trigger	Fixed is optional
DC Voltage Adjustment	60 to 84 microseconds (for horizontal centering)

ENVIRONMENTAL CHARACTERISTICS

Operating Altitude	10,000 feet minimum pressure altitude
Temperature	
Operating	0 to 55 degrees C
Non-Operating	—40 to 65 degrees C
Humidity (operating)	10 to 95 percent (non-condensing)
Shock	Withstands 18-inch drop test (in shipping carton)
Vibration (Non-Operating)	Withstands 2 G's, 95 to 3000 Hz (in shipping carton)
X-Radiation	Complies with DHEW rules 42-CFR, part 78
Power Dissipation	Less than 50 watts

INPUT POWER

Unregulated DC input 55 to 69 volts at 600 ma. AC power models accept 100-125/200-250 volts rms, 50/60 Hz input to power transformer of low radiation type or 55 to 69 volts rms AC input to self-contained rectifier/regulator

WEIGHT AND DIMENSIONS

Weight	Less than 25 pounds (without shipping carton)
Dimensions	10¾"H x 13¼"W x 11½"D

*Specifications are subject to change without notice.



Please send me the following information (check appropriate box):

- ☐ Touch Screen Digitizer Brochure
- ☐ Touch Screen Digitizer Technical Specifications
- ☐ Touch Screen Digitizer Price Sheet

- ☐ NDC-15 Display Monitor Brochure
- ☐ NDC-15 Display Monitor Technical Specification
- ☐ NDC-15 Display Monitor Price Sheet

Contact me immediately to discuss: _____

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____ Zip _____

TEL. (_____) _____

TSD DISPLAY PRODUCTS, INC. TEL. (516) 589-6652/TELEX 14-4659

35 ORVILLE DRIVE • BOHEMIA, NEW YORK 11716
TEL. (516) 589-6652/TELEX 14-4659

Sincerely,
TSD DISPLAY PRODUCTS, INC.

Thank you for your interest in our products. The literature you requested is enclosed.
If you require further information, please fill out and return the enclosed reply card.

TSD DISPLAY PRODUCTS, INC.



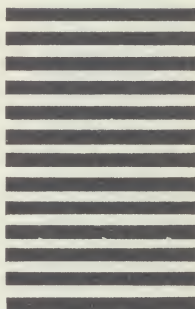
NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS Permit No. 58, Bohemia, New York 11716

POSTAGE WILL BE PAID BY ADDRESSEE

TSD Display Products, Inc.
35 Orville Drive
Bohemia, New York 11716





TSD DISPLAY PRODUCTS, INC.

July 9, 1979

Mr. Ted Nelson
President
COMPUTOPIA
Box 128
Swarthmore, PA 1081

Dear Mr. Nelson:

TSD Display Products, Inc., a wholly owned subsidiary of Megadata Corporation, would like to thank you for visiting with us at our booth during the NCC '79 Show June 4 through June 7.

Enclosed please find the literature you requested. I hope you will find it both interesting and informative.

If you should have any questions regarding your application please don't hesitate to contact me.

Very truly yours,

TSD DISPLAY PRODUCTS, INC.

A handwritten signature in dark ink, reading "Steven R. Sloan". The signature is written in a cursive style and is positioned above the printed name and title.

Steven R. Sloan
Marketing Manager

/dl
Enc.